1 444 936

PATENT SPECIFICATION (11) 1 444 936

(21) Application No. 29769/73 (22) Filed 22 June 1973
(23) Complete Specification filed 5 June 1974
(44) Complete Specification published 4 Aug. 1976
(51) INT CL² B61B 10/00
(52) Index at acceptance B7L 37
(72) Inventor WALTER DESMOND ORD

(19)

(54) IMPROVEMENTS IN OR RELATING TO POWER-AND-FREE CONVEYOR SYSTEMS

(71) We, REDMAN FISHER ENGINEERING LIMITED, a British Company, of Birmingham New Road, Tipton, in the County of Stafford, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a conveyor system of the kind comprising a track for supporting for advancement therealong a plurality of trolleys and an elongated power-driven propelling element supported for movement along a path parallel to said track, the propelling element and at least some of the trolleys having dogs which can co-operate to transmit drive from the propelling element to the trolleys.

It is common for the trolleys to be coupled together into one or more trains and in such cases the or each train is normally driven by engagement between a single driving dog of the train and a co-operating dog of the propelling element. It is normal to provide in the or each train one or more auxiliary dogs additional to the driving dog through which the train is normally driven. Examples of such auxiliary dogs are a hold-back dog which is engageable with dogs of the propelling element to prevent the train overrunning the propelling ellement, and an auxiliary driving dog by means of which the train can be driven under circumstances such that the main driving dog is temporarily inoperative.

One circumstance under which the main driving dog may be inoperative is when a train is passing from the control of one propelling element to the control of a further propelling element. The arrangement is normally such that the main driving dog is dis-engaged from the co-operating dog of the first propelling element before it is engaged by a dog of the second propelling element. It is therefore common to provide an auxiliary driving dog by means of which the train can be driven from the first propelling element during the period for which the main driving dog is not engaged by a dog of either propelling element.

To avoid risk of interference of one propelling element with operation of the other propelling element, it is desirable that an auxiliary driving dog should normally be inoperative and should be brought into operation only for the period during which the main driving dog is inoperative. It has therefore been proposed that an auxiliary dog should be mounted on a trolley for movement between operative and inoperative positions and there should be provided at a predetermined position along the track means for moving the auxiliary dog to its operative positions. An example of such an arrangement is described in British Patent Specification No. 1,229,541. In this specification there is described an auxiliary dog which is mounted on a trolley for pivoting movement about a horizontal axis and is provided with a cam follower for engagement with a ramp fixed to the track. When the follower engages with the ramp during advancement of the trolley, the auxiliary dog is pivoted upwardly to an operative position. When the follower passes off the ramp, the dog falls back to an inoperative position.

One disadvantage of the arrangement described in Specification 1,229,541 is that gravitational forces are relied upon to return the auxiliary dog to its inoperative position. It is therefore possible that, if free pivoting of the auxiliary dog is inhibited by, for example, the penetration of foreign matter between the relatively movable bearing surfaces of the pivot, or lack of proper maintenance and lubrication, the auxiliary dog may fail to return to its inoperative position. This may lead to jamming of the conveyor system and possibly to damage thereof.

It is an object of the present invention to overcome this disadvantage of the conveyor system.

According to the present invention there

is provided a conveyor system of the kind comprising a track, a plurality of trolleys supported on the track for movement therealong and an elongate power-driven propelling element supported for movement along a path parallel to said track, the propelling element and at least some of the trolleys having dogs which can co-operate to transmit drive from the propelling element to the trolleys, wherein at least one of the trolleys has a dog movable between operative and inoperative positions, in the former only of which positions the dog can co-operate with a dog of the propelling element to enable the trolley to be driven or retarded by the propelling element, characterised by the provision at a first position along the track of first control means operative, when the trolley passes said first position, to displace the dog positively to its operative position and at a second position along the track of second control means operative, when the trolley passes said second position, to displace the dog positively to its inoperative position.

The dog of the trolley may be so arranged as to be settable in a selected one of its operative and inoperative positions and to remain in such selected position until acted upon by some further member. With such an arrangement, it is not necessary for the control means to be arranged for holding the dog in its operative position. The control means may be arranged merely to cause movement of the dog when the trolley reaches selected positions on the track.

According to the invention there is also provided a trolley which is adapted for use in a conveyor system in accordance with the invention by the provision of a dog which is mounted on a body of the trolley for movement relative thereto between operative and inoperative positions, such movement including at least a component in a direction which, when the trolley is on a horizontal length of track, is horizontal and transverse to the length of the track, and further by the provision of an arm which projects laterally of the trolley body for co-operation with control means past which the trolley moves in use, the arm being movable relative to the body between first and second positions and being so associated with the dog that upon movement of the arm to its first position the dog is set positively in its inoperative position and upon movement of the arm to its second position the dog is set positively in its operative position.

It will be appreciated that gravitational forces do not tend to promote horizontal movement of the dog.

The invention will now be described by way of example with reference to the accompanying drawings, wherein:—

FIGURE 1 shows in side elvation a trolley and a portion of the track of a conveyor system in accordance with the invention, the trolley having a movable auxiliary driving dog,

FIGURE 2 shows the trolley and track in cross-section on the line II—II of Figure 1,

FIGURE 3 shows a plan view of the trolley and a portion of the track on which it runs,

FIGURE 4 shows in plan view and on an enlarged scale certain parts of a modified version of the trolley of Figure 1,

FIGURE 5 is a view in side elevation and on a scale intermediate those of Figures 1 and 4, showing the parts of the modified trolley shown in Figure 4 together with a part of the track on which the trolley runs and control means mounted on the track, and

FIGURE 6 is an end view of the parts shown in Figure 5 on the same scale as Figure 5.

The conveyor system illustrated in Figures 1, 2 and 3 comprises a load bearing track comprising two channel section members 10 and 11 which are arranged with their respective webs 12 vertical and with their flanges 13 directed towards one another. A power driven propelling element (not shown) in the form of an endless chain is supported for movement along a path above and parallel to the track 10, 11. A plurality of driving dogs are attached to the chain and project downwardly therefrom towards the gap between the track portions 10 and 11. One such driving dog is indicated at 14 in Figures 1 and 2. These driving dogs would normally be spaced at regular intervals along the power driven chain.

The conveyor system further comprises a plurality of trolleys, one only of which is illustrated. The particular trolley shown is intended for use as the trailing trolley of a train of coupled trolleys. The trolley shown has a body 15 comprising two vertical plates 16 arranged in side-by-side spaced relation. Two pairs of running wheels 17 which run on the lower flanges of the track portions 10 and 11 are mounted on the body 15. There are also mounted on the body guide wheels 18 which are rotatable about respective vertical axes and run between the opposed flanges of the track portions 10 nd 11. An opening 19 is formed in the body to enable a load to be suspended therefrom.

The trolley further includes an auxiliary driving dog 20 which projects upwardly from the body 15 towards the power driven propelling element and which can be engaged by the driving dogs 14. The auxiliary driving dog 20 is intended to be operative only at times when a main driving dog, normally provided on the leading trolley of a train, is inoperative. Accordingly, the dog 20 is mounted on the trolley

for movement between an operative position in which it lies in the path of the driving dogs 14 and an inoperative position in which it is off-set from the path of the dogs 14. In Figures 1 and 3, the auxiliary driving dog is shown in its operative position and in Figure 2 the auxiliary driving dog is shown in full lines in its operative position and in broken lines at 20a in its inoperative position.

The auxiliary driving dog 20 is arranged for pivotal movement between its operative and inoperative positions about a vertical axis 21. The dog 20 is rigidly secured to and projects upwardly from a carrier element 22 comprising an upper wall 23 which is of square shape, as viewed in plan, and is formed with a central bearing opening. A pivot 24 is received within the bearing opening of the carrier element 22, this pivot projecting upwardly from a horizontal plate 25 to which it is secured. The plate 25 is secured to a vertical plate 26 which is received in and bolted to the body 15 of the trolley. An annular washer is interposed between the horizontal plate 25 and the wall 23 and the carrier element is retained on the pivot 24 by means of a circlip 27.

The carrier element 22 further includes lateral walls 28 which project downwardly from the upper wall 23 through the slot defined by the free edges of the upper flanges 13 of the track. The dimensions of the carrier element 22 are such that, as shown in Figure 3, a small clearance is normally provided between the lateral walls 28 and the flanges of the track. Owing to the square shape of the carrier element, this small clearance is not sufficient to permit pivoting movement of the carrier element about the axis 21 and the auxiliary driving dog 20 is therefore normally held in one or other of its operative and inoperative positions.

At certain positions along the track, the upper flanges 13 are cut away as shown at 29 and 30 in Figure 3 to provide sufficient clearance between the flanges and the carrier element 22 to permit pivoting of the dog 20 about the axis 21.

To bring about pivoting of the dog 20 about the axis 21, control means is provided adjacent to the cut-outs 29 and 30. The control means comprises stationary abutments, one of which is shown at 31 in Figure 3. For co-operation with the abutment 31 there is provided on the carrier element 22 a striker arm 32. This striker arm projects radially of the axis 21. A further striker arm 33 projects from the carrier element 22 in a direction diametrically opposite to that of the arm 32, the arm 33 being provided for co-operation with abutments similar to the abutment 31 but provided on the other side of the track.

As shown in Figure 3, when the dog 20 occupies its operative position, the striker arms 32, 33 project in directions inclined to the direction of travel at 45°. The free end face 34 of the arm 32 then extends perpendicular to the direction of travel for face-to-face engagement with the abutment 31. When the arm 32 is engaged with the abutment 31 and the trolley continues to move past the abutment, the carrier element 22 turns about the axis 21, in an anti-clockwise direction as viewed in Figure 3, through an angle of 90°. The face 34 of the arm 32 is then parallel to the direction of travel and the arm just clears the abutment 31 so that the abutment does not prevent passage of the trolley.

The free end face 35 of the arm 33 is perpendicular to the end face 34 and when the latter is parallel to the direction of travel, the face 35 is perpendicular thereto and facing forwardly. Thus, when the dog 20 is in its inoperative position and the trolley moves past an abutment on the side of the track opposite to the abutment 31, the arm 33 will be engaged and will cause the carrier element 22 to pivot through an angle of 90° in the clock-wise direction, as viewed in Figure 3, thereby returning the auxiliary dog 20 to its operative position.

It will be noted that the auxiliary dog 20 is moved in both directions between its operative and inoperative positions positively. Reliance is not placed on gravitational or other forces which merely bias the auxiliary dog towards one or other of its positions. Furthermore, when the auxiliary dog has been set by the control means either to its operative position or to its inoperative position, it does not tend to move out of such position until it is moved once more by the control means.

A stop 36 projects from the lower extremity of one of the lateral walls 28 for engagement with the body 15 of the trolley to limit pivoting movement of the carrier element 22 about the axis 21 to a range of approximately 90°. Whilst the particular example of trolley shown in Figures 1 to 3 is arranged for pivoting of the auxiliary dog in opposite directions between its operative and inoperative positions, it will be appreciated that the trolley could alternatively be arranged for uni-directional movement of the auxiliary dog, in which case the dog would be adapted to-operate with the driving dogs 14 both when it is in a position before the axis 21 and when in a position behind the axis 21.

In Figures 4, 5 and 6 there is illustrated a modified version of the trolley shown in Figures 1, 2 and 3, which modified trolley has an alternative arrangement for holding the auxiliary dog against pivoting movement other than at times when the dog is required

to be moved between its operative and inoperative positions. In Figures 4, 5 and 6, parts corresponding to those previously described with reference to Figures 1, 2 and 3 are indicated by like reference numerals with the prefix 1 and the preceding description is deemed to apply thereto, except for the differences hereinafter mentioned.

The carrier element 122 of the trolley shown in Figures 5, 6 and 7 is in the form of a circular plate which is disposed horizontally and is mounted on a vertical pivot 124. Striker arms 132 and 133 are welded onto the plate 122 at the upper side thereof and project diametrically opposite directions for co-operation with abutments 131 rigidly secured to the track. The auxiliary dog 120 is also rigidly secured to the plate 122 at the upper side thereof and projects upwardly from the plate.

For holding the carrier plate 122 in a position to which it is set, there is provided holding means in the form of a latch 137. The latch is pivotally mounted on a support 138 for movement relative thereto about a horizontal axis which is off-set laterally from the axis 121. The support 138 is rigidly secured to a bush 139 in which the pivot 124 is mounted, this bush being rigidly secured to the body 113. Two notches 140, 141 are formed in the periphery of the plate 122 to receive an end portion 142 of the latch, when the latter is in the holding position shown in Figure 5. In this holding position, the latch prevents pivotal movement of the dog 120 about the axis 121. A further end portion 143 of the latch is considerably more massive than the end portion 142 and, since these end portions are spaced approximately equally on opposite sides of the latch pivot, the end portion 143 biases the end portion 142 upwardly into its holding position.

For moving the latch 137 to its releasing position, the control means further comprises a cam 144 which is fixed relative to the track portion 111 and is positioned for engagement with the end portion 143 of the latch. The cam presents towards an approaching latch an upwardly inclined surface up which the end portion 143 is drawn as a trolley moves past the cam. Accordingly, the cam causes the end portion 142 to move downwardly out of the notch in which it is engaged to a releasing position in which it is clear of the plate 122. The cam 144 is arranged to hold the latch in its releasing position whilst an adjacent abutment 131 is engaged by one of the striker arms 132, 133. The latch moves out of engagement with the cam when the notch has moved out of register with the end portion 142. This end portion is then urged into engagement with the underside of the plate 122 until the other notch is brought into register, whereupon the end portion enters the notch to hold the plate 122 once more against pivoting movement.

A cam 144 for co-operation with the latch 137 is provided at one side of the track on the track portion 111 near to each abutment 131, irrespective of whether the abutment is provided at the same side of the track as the cam, or at the opposite side of the track. Where an abutment and a cam are mounted at the same side of the track, they may be mounted on a common bracket 145, as shown in Figures 5 and 6. Where the abutment and cam are on opposite sides of the track, they would be provided with individual brackets.

Upward movement of the end portion 142 of the latch within each of the notches 140, 141 is limited by a cap 146 which extends over the notch at the upper side of the plate 122.

The trolleys illustrated in Figures 1 to 3 and 4 to 6 may be further modified by arranging the auxiliary dog for pivoting movement about an axis which is inclined to the vertical and lies in a vertical plane which extends in the direction of travel. With such a modification, pivoting of the dog would cause it to move upwardly and downwardly, as well as laterally, so that in its inoperative position it may lie below the path of travel of the driving dogs 14, rather than beside such path.

WHAT WE CLAIM IS:—

1. A conveyor system of the kind comprising a track, a plurality of trolleys supported on the track for movement therealong and an elongate power-driven propelling element supported for movement along a path parallel to said track, the propelling element and at least some of the trolleys having dogs which can co-operate to transmit drive form the propelling element to the trolleys, wherein at least one of the trolleys has a dog movable between operative and inoperative positions, in the former only of which positions the dog can co-operate with a dog of the propelling element to enable the trolley to be driven or retarded by the propelling element, characterised by the provision at a first position along the track of first control means operative, when the trolley passes said first position, to displace the dog positively to its operative position and at a second position along the track of second control means operative, when the trolley passes said second position, to displace the dog positively to its inoperative position.

2. A conveyor system according to claim 1 wherein the dog of said trolley is so arranged as to be settable in a selected one of its inoperative and operative positions and to remain in such selected position until acted

upon by some further memeber.

3. A conveyor system according to claim 2 wherein said dog is pivotally mounted for movement about a pivot axis which is substantially vertical when the trolley is on a horizontal length of track.

4. A conveyor system according to claim 3 wherein said dog is rigidly connected to one or more arms which project radially of said pivot axis for engagement with the control means.

5. A conveyor system according to claim 4 wherein the control means comprises a plurality of fixed abutments spaced from one another along the track.

6. A conveyor system according to any one of claims 3, 4 and 5 wherein stop means is provided on the trolley for limiting pivotal movement of said dog to a range of approximately 90°.

7. A conveyor system according to claim 1 wherein holding means is provided for preventing movement of said dog between its operative and inoperative positions during periods when the dog is required to remain in a selected one of such positions.

8. A conveyor system according to claim 7 wherein said holding means comprises an element which is fixed with respect to the dog and, when the trolley travels along certain portions of the track, lies within a slot defined by the track and extending longitudinally thereof, the dimensions of said element relative to those of the slot being such that whilst the element is within the slot it prevents movement of the dog between its operative and inoperative positions.

9. A conveyor system according to claim 7 wherein the holding means, comprises a latch mounted on the trolley for movement between holding and releasing positions in the former of which it holds the dog in a selected one of the operative and inoperative positions.

10. A conveyor system according to claim 9 wherein said latch is pivotally mounted on the trolley and the control means comprises a cam which engages with the latch as the trolley passes the cam to pivot the latch to its releasing position.

11. A trolley adapted for use in a conveyor system according to claim 1 by the provision of a dog which is mounted on a body of the trolley for movement relative thereto between operative and inoperative positions, such movement including at least a component in a direction which, when the trolley is on a horizontal length of track, is horizontal and is transverse to the length of track, and further by the provision of an arm which projects laterally of the trolley body for co-operation with control means past which the trolley moves in use, the arm being movable relative to the body between first and second positions and being so associated with the dog that upon movement of the arm to its first position the dog is set positively in its inoperative position and upon movement of the arm to its second position the dog is set positively in its operative position.

12. A trolley according to claim 11 wherein, when the trolley is on a horizontal length of track, movement of the dog between the operative and inoperative positions includes no vertical component.

13. A conveyor system substantially as hereinbefore described with reference to and as illustrated in Figures 1 to 3 of the accompanying drawings.

14. A conveyor system substantially as herein described with reference to and as illustrated in Figures 4 to 6 of the accompanying drawings.

15. A trolley for use in a conveyor system according to claim 1, the trolley being substantially as hereinbefore described with reference to and as illustrated in Figures 1, 2 and 3 of the accompanying drawings.

16. A trolley for use in a conveyor system according to claim 1, the trolley being substantially as herein described with reference to and as illustrated in Figures 4 to 6 of the accompanying drawing.

FORRESTER, KETLEY & CO.,
Chartered Patent Agents,
Rutland House,
148 Edmund Street,
Birmingham B3 2LD,
—and—
Forrester House,
52 Bounds Green Road,
London N11 2EY.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1976.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1444936 COMPLETE SPECIFICATION
6 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 1

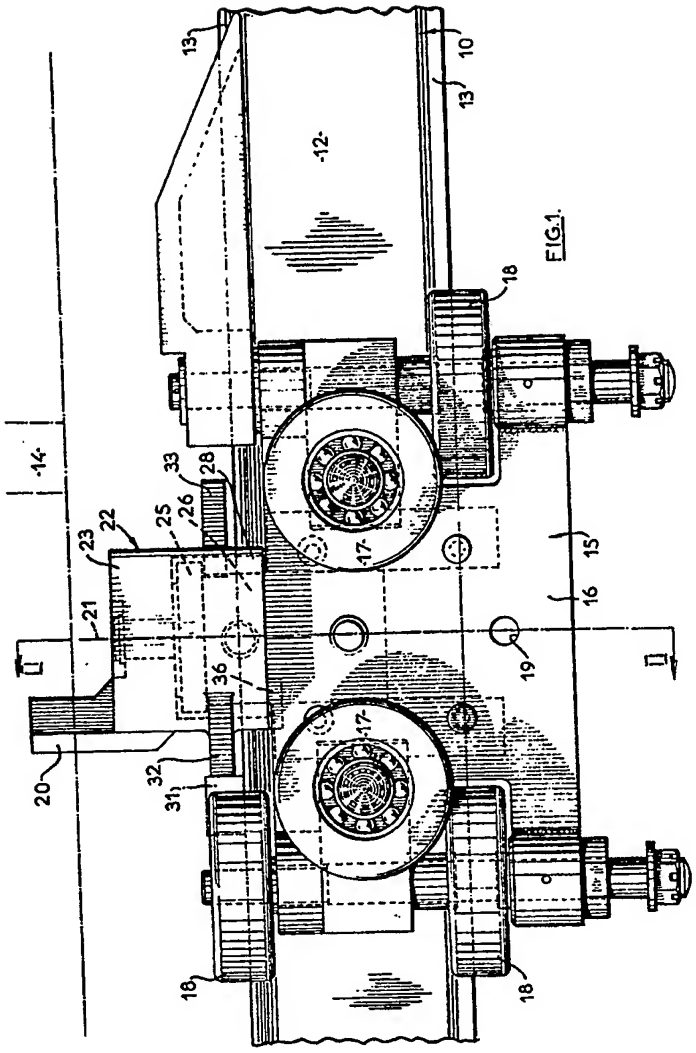
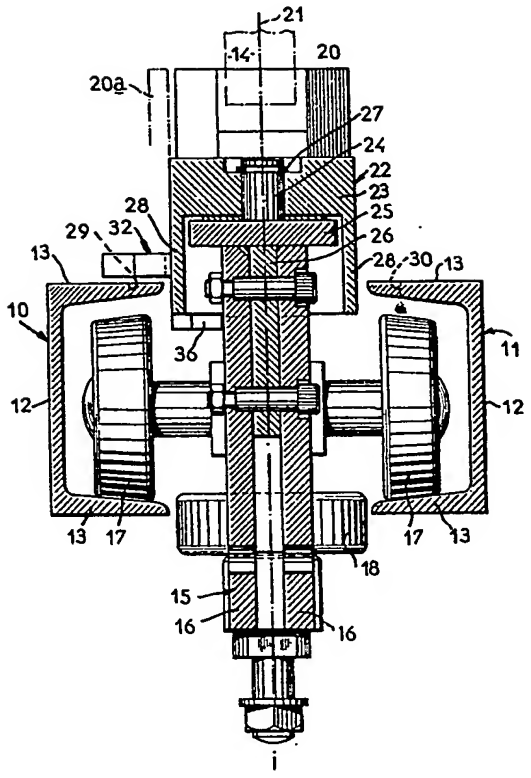


FIG.1.

FIG.2.


21
14
20
20a
27
24
22
23
25
26
28
30
13
28
29
32
13
10
11
12
12
36
13
17
17
13
18
15
16
16

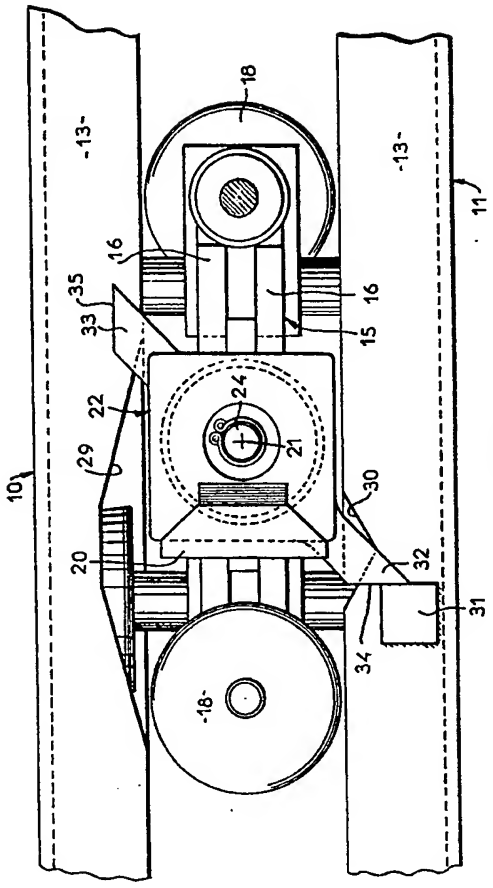


FIG.3.

1444936 COMPLETE SPECIFICATION
6 SHEETS

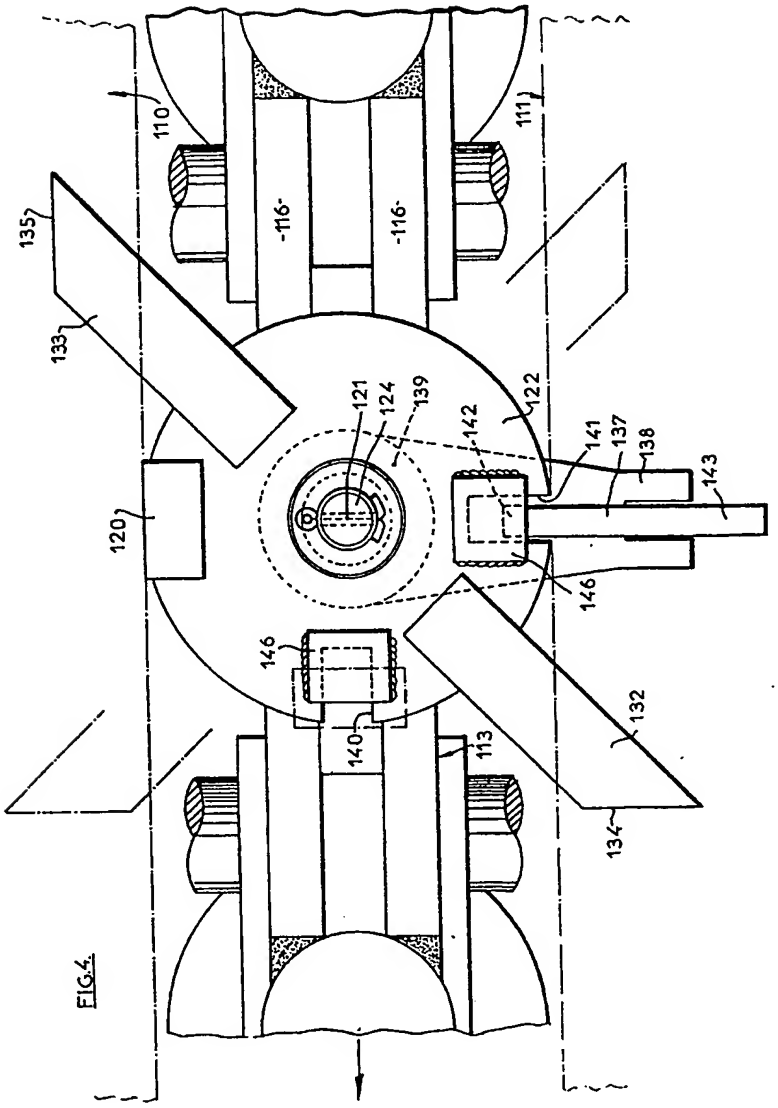


FIG.4.

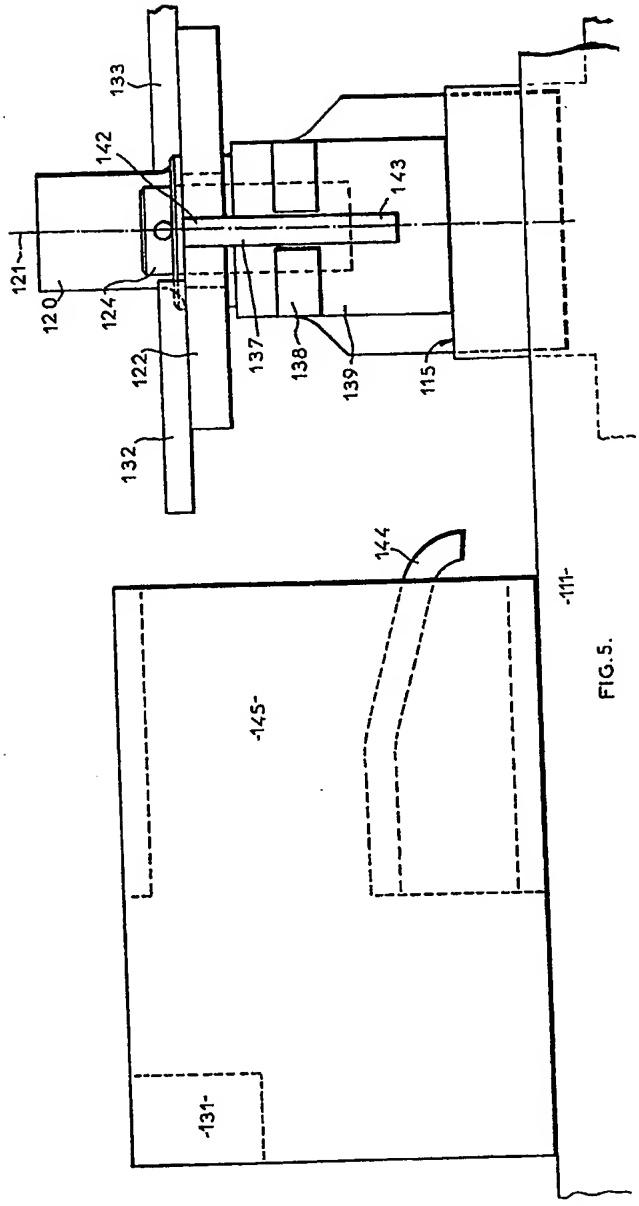


FIG. 5.

1444936 COMPLETE SPECIFICATION
6 SHEETS

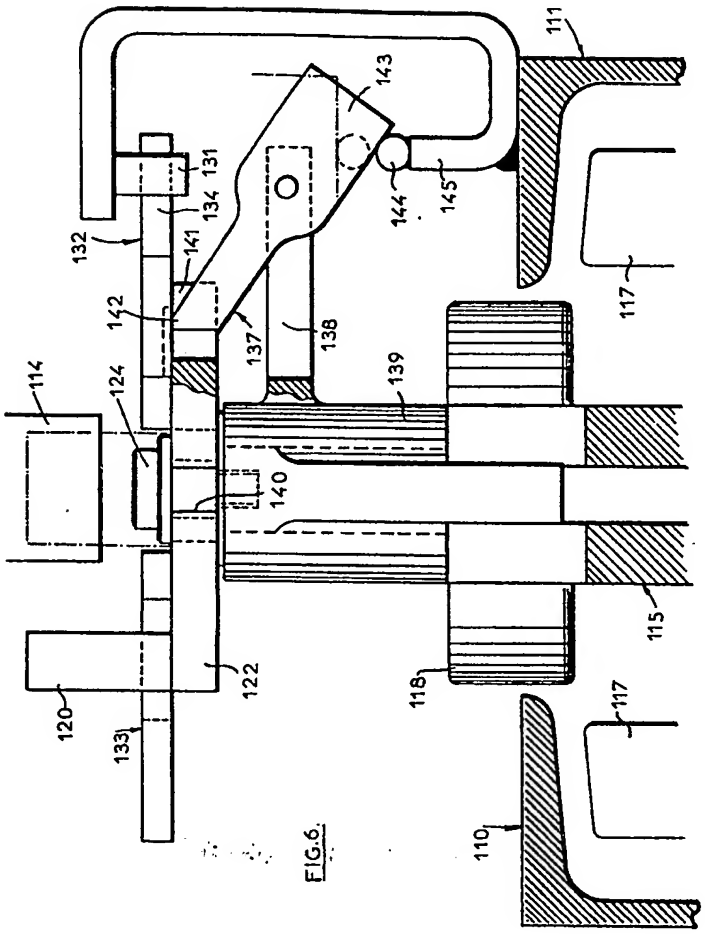


FIG.6.